BIOSIGNAL PROCESSING APPARATUS AND METHOD

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit under 35 USC 119(a) of Korean Patent Application No. 10-2015-0105568 filed on Jul. 27, 2015, in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference for all purposes.

BACKGROUND

[0002] 1. Field
[0003] The following description relates to a biosignal processing apparatus and a biosignal processing method.
[0004] 2. Description of Related Art
[0005] Recently, due to an aging population structure, increasing medical costs, and a lack of personnel engaged in special medical services, research has been conducted on information technology (IT)-healthcare convergence technology in which IT is applied to medical technology. Thus, monitoring a health condition of an individual may be enabled anywhere, for example, at home and work, during daily life. For example, monitoring a health condition of a user may be enabled through mobile healthcare.
[0006] A biosignal may be used to monitor a health condition. The biosignal may be, for example, an electrocardiogram (ECG) signal, a photoplethysmogram (PPG) signal, or an electromyogram (EMG) signal. With ensured mobility and convenience of a biosignal measuring apparatus, monitoring a health condition may be performed more readily during daily life.
[0007] However, despite the ensured mobility of the biosignal measuring apparatus, correct measurement of a biosignal may not be possible due to a motion artifact that may be generated from, for example, an unstable external environment and a movement of a user.

SUMMARY

[0008] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.
[0009] In one general aspect, a biosignal processing apparatus includes a communication interface configured to receive a biosignal; and a processor configured to set a target interval of the biosignal, calculate a quality metric corresponding to the target interval based on a target component that is a frequency component of the target interval corresponding to a set value and a non-target component that is a frequency component of the target interval not corresponding to the set value, and estimate a quality of the biosignal based on the quality metric.
[0010] The processor may be further configured to convert the target interval to a frequency domain signal, and define, as the target component, a frequency component that is an integral multiple of the set value among frequency components of the frequency domain signal.
[0011] The processor may be further configured to extract from the target interval a first number of signals corresponding to the target component, and extract from the target

interval a second number of signals corresponding to the non-target component; and the second number may be defined based on the first number and the set value.
[0012] The processor may be further configured to calculate the quality metric using an electric power of the extracted first number of signals and an electric power of the extracted second number of signals.
[0013] The processor may be further configured to change either one or both of the target interval and the set value after the calculating of the quality metric, calculate another quality metric different from the quality metric based on the changed either one or both of the target interval and the set value, and determine a first maximum quality metric among the quality metric and the other quality metric.
[0014] The processor may be further configured to determine a second maximum quality metric of another biosignal different from the biosignal, determine a maximum value among the first maximum quality metric and the second maximum quality metric, and determine a target interval corresponding to the maximum value to be a target biosignal to be monitored.
[0015] The processor may be further configured to determine whether the first maximum quality metric is greater than or equal to a threshold value, and determine a target interval corresponding to the first maximum quality metric to be a target biosignal to be monitored in response to a result of the determining being that the first maximum quality metric is greater than or equal to the threshold value.
[0016] The processor may be further configured to change the target interval by a first step size at least once to obtain at least one first changed target interval, calculate a quality metric corresponding to each of the at least one first changed target interval, select a target interval having a maximum quality metric among the target interval and the at least one first changed target interval, change the selected target interval by a second step size at least once to obtain at least one second changed target interval, calculate a quality metric corresponding to each of the at least one second changed target interval, and determine a first maximum quality metric based on the quality metric corresponding to the selected target interval and each of the at least one second changed target interval.
[0017] The processor may be further configured to determine the target interval to be a target biosignal to be monitored, and define a magnitude of a signal corresponding to the non-target component of the target interval to be a preset value.
[0018] The processor may be further configured to obtain period information of the target biosignal to be monitored.
[0019] In another general aspect, a biosignal processing apparatus includes a quality metric definer configured to define a quality metric based on a target component and a non-target component of a target interval of each biosignal of a plurality of biosignals; a quality estimator configured to estimate respective qualities of the biosignals based on the quality metric; and a determiner configured to determine a target biosignal to be monitored among the biosignals based on the qualities of the biosignals; and the target component may be a frequency component of the target interval corresponding to a set value, and the non-target component may be a frequency component of the target interval not corresponding to the set value.
[0020] The quality estimator may be further configured to obtain a representative quality metric of each biosignal; and